official duties, yet in continuous touch with the whole meteorological world, wasting no time over controversy, keen to appreciate the scientific laws and scrupulous impartially to place everything that complied therewith at the service of the whole scientific world.

Fully occupied in the enjoyment of his work, he was too busy for journeys that would separate him from it. Since 1898 he has not often been seen outside Vienna or his summer resort. He leaves a widow, a son, and two daughters to mourn his loss, which calls forth the assured sympathy of colleagues and friends in all parts of the world.

Hann received many distinctions. He was "Hofrat" in 1891, and subsequently was ennobled with the prefix "von"; but he made little display of the distinction. He had also the Ehrenzeichen für Kunst und Wissenschaft, and was a Knight of the Prussian Order "Pour le Mérite," a member of the Academy of Vienna, and honorary or foreign member of foreign academies and societies in all parts of the world. He was the recipient of the Buys Ballot medal, the Symons medal, and many other recognitions of his preeminent services.

NAPIER SHAW.

BENJAMIN HARRISON.

THE late Benjamin Harrison was born on December 14, 1837, at Ightham, Kent, where his family had resided for several generations. Educated locally, he had the good fortune to be trained by two schoolmasters interested in science and archæology, and thus the natural trend of his mind was greatly stimulated. On leaving school at the age of fifteen he entered his father's shop, and after his father's death carried on the business of grocer until a few years ago. He passed peacefully away on October 1 after a few days' illness in the house in which he was born. He was married twice, his first wife dying in 1877, and his second wife (for many years an invalid) surviving him only a week. He leaves one son and two daughters.

In early life Harrison was a keen botanist and an enthusiastic collector of fossils and flint implements, and he soon got in touch with such well-known workers as the late Lord Avebury, F. C. J. Spurrell, and Roach Smith. In 1870 he met the late Sir Joseph Prestwich, who, perceiving the importance of his discoveries, encouraged him in many ways. As a result of Harrison's field work, Prestwich, in 1889, published his well-known paper on the Palæoliths of Ightham (Quart. Journ. Geol. Soc., vol. 45, pp. 270–294), followed in 1891 by the Darenth paper (*op. cit.*, vol. 47, pp. 120–160), and in 1892 by the paper on the plateau implements (Journ. Anthrop. Inst., vol. 21, pp. 246–262), Prestwich claiming for these rudely chipped flints a much greater antiquity than the Palæoliths. This was the beginning of the great "Eolithic" controversy which has not yet received its final solution, and it would appear as though there will always be two opinions respecting "Eoliths." Henceforward Harrison's spare time was spent in accumulating evidence in support of the "Eoliths" and in elucidating other prehistoric problems, whilst his house became a Mecca for all students.

Harrison's name will always be associated with "Eoliths," but it was his evidence that enabled Prestwich to establish the "hill group" of Palæoliths whilst the excavations carried on by Harrison at the rock shelters at Oldbury yielded many late Palæoliths which are now regarded as St. Acheul II. Harrison published but little, yet no one was more willing to assist others with his knowledge. An extremely well-read man, his ready wit, kindness of heart, and cheerful disposition endeared him to a large circle of friends, who now mourn the loss of "old Ben." In 1895 he was awarded the Lyell fund by the Geological Society, and in later life he was the recipient of a Civil List pension. Harrison was one of those humble workers for science who, in the face of great difficulties, rise superior to their surroundings by strength of character and industry, and leave an imperishable name behind.

Notes.

AT a meeting of the Optical Society held on Thursday, October 13, the resolution passed early in 1915 suspending certain members, subjects of countries then at war with Great Britain, was revoked.

THE Thomas Hawksley lecture of the Institution of Mechanical Engineers for the present year is to be delivered at the institution on Friday, November 4, at 6 o'clock, by Dr. H. S. Hele-Shaw, who will take as his subject "Power Transmission by Oil."

AT the opening of the annual meeting of the Société de Chimie industrielle on October 10 the Dumas medal of the society and an illuminated address were presented by M. Dior, Minister of Commerce, to Sir William J. Pope.

"EARLY Relations of Egypt, Babylonia, and Syria" is the subject of a lecture to be delivered by Mr. Percy E. Newberry on Thursday, October 27, at 8.30 p.m., at the rooms of the Royal Society, Burlington House. This lecture is the first of a series on Egypt to be arranged by the Egypt Exploration Society. Tickets and further details can be obtained from the Secretary, 13 Tavistock Square, W.C.1.

THE programme for the session 1921–22 of the Institute of Metals contains, in addition to announcements of general meetings of the institute, the first list of meetings of the newly-formed London Local Section. There are now in existence local sections in Birmingham, Sheffield, Glasgow, and London, and monthly meetings have been arranged at which papers by well-known workers will be read. Membership of local sections is open free to all members of the institute. The council of the institute has sent out, with the annual programme, a pamphlet comprising a series of notes for the guidance of those preparing papers for publication in the Journal of the Institute of Metals. This action should result not only in a commendable uniformity in the form of papers, but may also secure economy in the costs of production of scientific communications—a result much to be desired.

IN a thoughtful article in *The Scientific Monthly* for September (p. 214) Prof. Irving Fisher discusses impending problems in eugenics resulting from war, hygiene, birth-control, and immigration. He concludes that his surveys "seem to indicate that much of what we call progress is an illusion, and that really we are slipping backwards while we seem to be moving forwards. Human ambitions under the opportunities afforded by civilisation seem to sacrifice the race to the individual. We congregate in great cities and pile up great wealth, but are conquered by our very luxury. We seek imperial power and not only damage, but destroy, our germ plasm in war. We seek social status and education, but limit motherhood. Like moths attracted by a candle, we fly towards the glamour of wealth and power and destroy ourselves in the act."

A TIMELY and very necessary protest against the restrictions imposed upon the collection of birds and their eggs for scientific study in certain States in California appears in *California Fish and Game* (vol. 7, No. 3). It is pointed out that there "are about one hundred and fifty scientific collectors in California, as contrasted with more than one hundred and eighty thousand 'hunters,'" or, as we should say, "sportsmen." "Since practically all useful information regarding wild birds and animals," it is remarked, "is a result of the acquisition of specimens, the necessity for work of this kind is evident. The curtailment of scientific collecting must result in decreased scientific information. Furthermore, there is a danger of decreasing the number of ornithologists by cutting off the opportunity for the right kind of study. Our best ornithologists owe their early interest and their development largely to the unrestricted chance for securing specimens." We heartily endorse this protest.

MESSRS. E. A. HOOTON and C. C. Willoughby, in the Papers of the Peabody Museum of American Archæology and Ethnology, Harvard University (vol. 8, No. 1), report the results of the excavation of an Indian village site and cemetery near Madisonville, Ohio. The occupation of this site covered the interval immediately preceding the first intercourse of the Indians of this region with Europeans, and extended into the proto-historic period, during which the inhabitants were able to procure a small amount of European metals and glass beads, either from early missionaries or travellers, or indirectly through their Indian neighbours. This culture in prehistoric times extended over a considerable portion of southern Ohio, and there appears to have been a migration of these Indians, driven south by the Iroquois, into the region of the Ohio River. Unfortunately there is little osteological material available from the States of Indiana and Kentucky for comparison with that of Madisonville, and the skeletal remains from the graves of the great earthwork builders of Ohio, now in the museum, have not been as yet systematically studied.

IN the *Fortnightly Review* for October Mr. Julian S. Huxley makes some suggestive observations on the evidences of variation and evolution as they occur in nature, derived from his study of the bird life of Spitsbergen during a visit to that island as a member of the Oxford University Expedition. The ringed or bridled guillemot is a simple Mendelian mutant of the common guillemot, differing only in the presence of a line of white encircling the eye and prolonged backwards across the side of the head. The two varieties live together and interbreed. The process of differentiation has progressed further in the Spitsbergen puffin and Mandt's guillemot, which are distinct northern geographical races of the common puffin and black guillemot, characterised by their larger size and paler colour. In the Spitsbergen geese, skuas, and eiders are found closely related species inhabiting the same region, but adapted to different modes of life. They are distinct in habit as well as in structure; the barnacle goose nests on the cliffs, the Brent goose on the low islands; Buffon's skua appears to keep more to the hills than Richardson's skua, while the king eider has been found nesting only singly on the tundra, not, like the common eider, in multitudes on islets.

AN excellent summary of our knowledge of the "bacteriophage" is given by d'Herelle, its discoverer, in *La Nature* of October 1, p. 219. The fundamental observation on this subject is as follows: a patient suffering from the bacillary form of dysentery is observed for, say, thirty days. Every day a sample of the fæces is mixed with broth, filtered through a porcelain filter to remove the bacteria present, and the series of filtrates is kept. At the end of the thirty days, thirty broth cultures of *B. dysenteriae* are prepared, and then to each culture tube one drop of a fæces filtrate is added, and the tubes are incubated. After twelve hours the following kind of result is obtained: tubes 1 to 6, unchanged; tubes 7 to 18, entirely clear and free from turbidity; tubes 19 to 30, unchanged. In the clear tubes the dysentery bacilli will be found to have dissolved, hence the disappearance of turbidity. D'Herelle maintains that the agent which causes the solution of the dysentery bacilli is an ultra-microscopic organism, to which he gives the name "bacteriophage," and which he supposes is of importance in cure and in immunity. Others believe that the agent is a catalyst which causes micro-organisms to produce autolytic ferments.

IN *Natural History* (vol. 21, No. 3), Mr. F. Morton Jones gives a most interesting account of the influence of insect-trapping plants on their insect associates, with special reference to those species of the moth Exyra which pass their entire life-cycle in intimate contact with pitcher plants of the genus Sarracenia. There are three species of Exyra, two of which are confined each to a single species of Sarracenia, and a third species, more adaptable than the other two, which seems equally at home in five other species of pitcher plant. Mr. Jones considers the plant–insect relation stage by stage in the life-cycle of the insects. He points out first those adjustments common to them all which relate to the general plan of the insect trap of Sarracenia, indicating an association ante-dating the splitting of the insect group, if not the plant group, into its several species. He then indicates the further adjustments which each species of moth shows to its own species of food plant, suggesting that the process of adjustment has continued, either coincident with the development of the plant species or at least following the insect's association with the plant. He concludes that the peculiar characters of the plant have been a significant factor in determining the course of evolution of the insects, and demonstrates the stages by which the latter have become adapted to their uniquely dangerous habitat.

WRITING in the August number of the *South African Journal of Industries* on "Science in the Service of the State," Mr. T. G. Trevor complains that the government of nations is still in the hands of the "predatory" class, although the civilisation of to-day depends in every detail of its existence on science and the labours of the "creative" class. He attributes the unfavourable position of the scientific and technical classes in the South African civil service to this fact. Scientific workers in the Union's civil service are pilloried indiscriminately with the clerical and administrative classes when the Parliamentary estimates are under discussion, yet since Lord Milner inaugurated the scientific departments of the Union Government service, "locusts have disappeared, malaria is a thing of the past, whole districts which were formerly regarded as impossible for white population are now fully peopled." The work on irrigation and cattle diseases has transformed vast areas. What is more important still, these services rendered "are infinitesimal compared to what they might be if it were once appreciated by the country at large what scientific work really is." The country should regard the expenses of those civil servants who are engaged in research and productive work as an investment. Instead, the Government offers a much lower salary to a chemist than the Rand Club offers to its billiard markers. Mr. Trevor outlines the administrative scheme under which the Union's men of science suffer. He is under the impression that things are vastly different in this country; there he is mistaken. Salaries are probably on a better level, but Mr. Trevor's criticism of the attitude towards science, the ignorance of the Parliamentarian, the contempt of the administrator, and the indifference of the average citizen, can be applied with equal appositeness to the condition of affairs here.

THE *Kew Bulletin* (No. 6, 1921) contains an account of a visit to the Cameroons and Nigeria by Dr. A. W. Hill, assistant director of the Royal Botanic Gardens, undertaken at the request of Sir Hugh Clifford, Governor of Nigeria. The main object of the visit was to report upon the Botanic Gardens at Victoria, Cameroons, which have suffered from some neglect during and since the war. A description of the gardens and associated buildings is given, and Dr. Hill strongly recommends their restoration to a state of proper order and efficiency. A large area of the British sphere of the Cameroons, from sea-level to about 1800ft., is occupied by large plantations, where cocoa, rubber, kola, oil palm, and bananas are extensively cultivated. The writer emphasises the need for a department of plant pathology at the Victoria Gardens for the investigation of the problems in relation to plant-diseases, selection, breeding, and the soil, which will arise on these extensive plantations. In addition to research, instruction should also be an important function of the garden. In Nigeria somewhat different conditions prevail; the soil is generally less fertile, and the cultivated plots are in native hands, and relatively small. Dr. Hill insists on the need for appointing agricultural chemists to study the principles of the native practices of cultivation, and to develop and improve any that are found to be of value. Economic botanists are also needed to investigate the native economic products and demonstrate their value for the good of the community. A brief visit was made to the Bauchi Plateau, a dry granitic area in Northern Nigeria, the botany of which had not previously been studied, and proved to be of considerable interest.

IN a pamphlet published by the Institution of Water Engineers, Mr. T. Sheppard collects the published facts relating to Spurn Point and the lost towns of the Humber coast. As regards Spurn Point, plans, and in recent times, measurements, give accurate data as to the growth of the land. This has been so rapid that from the seventeenth century onward the lighthouse at the point has been continually moved westward. Thus between 1766 and 1771 the point is said to have grown 280 yards in length, although during the next century its growth was slower, and barely exceeded the same amount. The point is still extending in length and width, but if the growth continues a break will occur somewhere in this narrow spit of land. This has probably occurred in the past, since more than one old chart shows an island where the peninsula now is. The lost town of Ravenser, the site of which is uncertain, possibly existed on such an island. Founded by the Danes in the ninth century, Ravenser became in time a flourishing and wealthy port, but during the sixteenth century it was entirely swept away. The last reference to the place is said to have been in Leland's "Itinerary." Mr. Sheppard goes at length into the story of this and other towns that have now vanished from the south and east coasts of Holderness.

The Jahrbuch des Norwegischen Meteorologischen Instituts for 1920 has been issued. As usual, it gives detailed data from Aas and Kristiania, a summary of the daily data from twelve important stations, and monthly means for some 70 stations. The volume also contains data from the Norwegian meteorological station at Green Harbour, Spitsbergen, including monthly means for 1919, and the daily records from July, 1919, to June, 1920. The Norwegian rainfall statistics for 1920 are published in "Nedböriakttagelser i Norge," and include data from 485 stations. A large-scale rainfall map of Norway is included.

Some notes on the "rollers" of Ascension and St. Helena are given on the Meteorological Chart of the East Indian Seas for November. As is well known, the leeward shores of these islands frequently experience a heavy swell from the north-west, which, setting in without any warning, produces a heavy surf. At other times, but less frequently, the swell is from the south-west. During the continuance of these rollers, which are heaviest during January and February, landing is difficult and hazardous. Records for St. Helena show that rollers prevail on about twenty-five days, and heavy swell on rather more than twice as many days in the year. The cause of this phenomenon is not thoroughly understood, but it is supposed to be due to distant gales of wind, either in the North or South Atlantic, blowing in the direction of the islands. This explanation appears to suit the facts, but further investigations are required. It is probable that the heavy swell on the Gold Coast has a similar origin.

Col. Sir S. G. Burrard's discussions of gravity anomalies in northern India and of the relation of the Himalayas to the Gangetic trough have been quoted in Nature (vol. 97, p. 391, 1916, and vol. 103, p. 351, 1919). His review of the evidence in favour of the theory of isostasy appeared in the Journal of the Royal Geographical Society for July, 1920. In 1917 Mr. R. D. Oldham published his important memoir on "The Structure of the Himalayas and the Gangetic Plain" (Mem. Geol. Surv. India, vol. 42, pt. 2), in which he laid stress on the mass of comparatively light sediment in the great trough stretching southward from the mountains. Lt.-Col. H. McC. Cowie (Survey of India, Prof. Paper, 18, 1921) now puts forward "A Criticism of Mr. R. D. Oldham's Memoir," in which he reviews the whole series of gravity anomalies in the region as at present known, and concludes that a deficiency of mass, widespread throughout the Gangetic area, is insufficient to explain the "very rapid fall, in a northerly sense, in the value of the residual between Dehra Dūn and Kaliana, Birond and Bansgopal, Siliguri and Jalpaiguri." The observed pendulum deflections at these and a number of other stations, and those deduced by taking into consideration a Gangetic trough in addition to surface masses, are given in Table VIII. Two series of residuals are obtained by subtracting from the observed deflections, first, the calculated deflections produced by the surface-features and their compensation, and, secondly, these deflections as modified by a trough of the dimensions given by Mr. Oldham. Lt.-Col. Cowie finds so little difference between the resulting quantities that the characteristic anomaly on the Himalayan edge remains for him a problem awaiting solution. The large contoured map on the scale of 1 : 3,000,000 accompanying his paper includes the whole "Himalayan-Tibetan mass," and has many obvious uses. Kaliana is given on it as Kallana.

The October issue of the *Philosophical Magazine* contains a paper on "Escapements and Quanta," which Sir Joseph Larmor communicated to the British Association at Edinburgh, and in which he suggests that the atom may be analogous to a clock. The outer electron system of the atom, on which its chemical and spectroscopic properties depend, and which has certain definite rates of oscillation, would correspond to the pendulum, or better, to a compound pendular system of a clock, and the inner core of the atom to the spring which, by means of the escapement, slowly imparts its energy to the pendulum in quanta fashion. Dynamical systems of this type are worth introducing into our theories of atomic constitution, and will, Sir Joseph thinks, well repay investigation.

The Société Genevoise d'Instruments de Physique send us an account of their new "universal microscope for mineralogical researches," intended for research work on the optical characters of microscopic crystals in thin sections of rocks. It can be arranged either so as to have the objective rigidly attached to the rotating stage in the manner devised by Nachet, or with the objective stationary while the stage rotates, and the Fedorov or theodolite stage can then be employed. There is apparently no mechanism for the simultaneous rotation of the Nicols. The stage can be lowered for use with objectives of long focal length—a circumstance which will be very useful in many cases. Another unusual feature is the use of adjustable adapters which remain fixed to the objectives. By means of these the small differences of centring between different objectives may be eliminated. A similar arrangement has been employed in this country.

The concluding remarks of the chairman, Mr. P. Raghavendra Rao, of the Board of Scientific Advice—to use its new name—at the Mysore Economic Conference held at Bangalore in June, dealt with the activities of the Board during the preceding year. The Government has been approached with the view of inducing it to instal plant for the production of sulphuric acid at the Bhadravati Iron Works. It is pointed out that as charcoal is the chief fuel used, it would be of considerable economic advantage if the grey acetate of lime, which is obtained from the acetic acid formed during production of charcoal, could be converted into glacial acetic acid on the spot. The Board has also considered the question of the manufacture of tannin extracts and of lac, as well as matters relating to the development of the sugar industry. Arrangements have been made by which one or two Indian students can receive a training in the scientific manufacture of sugar under the Imperial Department of Agriculture, Barbados, West Indies, and it is stated that the course is open to a student of chemistry or any other who is prepared to consider it.

A NOTE of the meeting at Bergen of the International Commission for the scientific investigation of the upper air, is given in the *Meteorological Magazine* for September. The meeting commenced on July 26, and was continued on the following days. The preceding (seventh) meeting of this Commission was held in Vienna in 1912, though at that meeting the time was mainly occupied with business questions, little time being given to scientific discussion. At the Bergen meeting, this year, the leading place was given to scientific contributions from the members of the Commission and other meteorologists interested in the work. Much attention was directed to further developments in the study of the Polar Front. Broadly speaking, the Scandinavian school finds that depressions occur in families of four, each following a track slightly further south than its predecessor, the first and third of the family being generally more intense than the second and fourth. The note mentions that on the average a new family begins every 6¼ days. The Commission decided that an international publication of the results of the investigation of the upper air on certain selected days should be continued, and a table is given showing the dates when the ascents are to be made. A report of the proceedings of the meeting has been published, and was presented to the International Meteorological Committee recently held in London.

AT the autumn meeting of the Iron and Steel Institute recently held in Paris a paper was contributed by M. L. Guillet on "The Position of the Metallurgical Industries of Northern and Eastern France: Their Destruction and Reconstruction." M. Guillet himself writes with first-hand knowledge of this subject, and emphasises that of the total destruction only a very small proportion was due to actual war damage; the bulk of it was deliberate, and had as its object the putting of French iron and steel works out of action for many years to come. He states that in some regions the work of demolition was carried out so systematically that a whole arsenal of works-breaking machinery was created for the purpose. He himself removed at the Biache Saint-Vaast Copper Works, near Arras, a whole series of high-explosive cartridges from the principal parts of the plant and machinery. The work of reconstruction has been truly remarkable considering the conditions under which it had to be undertaken. After the armistice it was impossible to rely on finding anything which might be needed in the immediate locality. Machinery, raw materials, and labour were lacking, and the workmen were scattered far and wide. A lack of coal and means of transport made it impossible to rely upon regions still intact. Details are given of how this situation was met in a number of the most important metallurgical districts and of the results accomplished. Despite the above handicaps and financial difficulties arising out of the incomplete Peace Treaty, the works are little by little resuming their activities. Moreover, in the course of their reconstruction they have been completely modernised, and it is probable, therefore, that their efficiency will be considerably increased. M. Guillet regards the outlook as both prosperous and promising.

AMONG the forthcoming books included in the announcement of the Cambridge University Press in NATURE of September 22, p. 131, was one by Major P. A. MacMahon, "New Mathematical Problems," the title of which, we are now informed, should have been given as "New Mathematical *Pastimes.*" The book contains a series of puzzles based on the permutations and combinations of elementary geometrical shapes, and is a contribution to the literature of mathematical recreations.

"OCEAN Research and the Great Fisheries," by G. C. L. Howell, is announced by the Oxford University Press as almost ready. The author writes about the organisation of ocean research, statistics, the apparent effect of the war on fish supplies, fish culture, etc., and discusses the problems connected with a dozen of the most important kinds of fish, dealing with the varieties separately.

"THE Dictionary of Applied Physics," which Messrs. Macmillan and Co., Ltd., propose to issue under the editorship of Sir Richard Glazebrook, is now in an advanced stage of preparation. The work will appear in five volumes of 600–700 pages each, the subjects of which are as follows:—(1) Mechanics, Engineering, and Heat; (2) Electricity; (3) Metrology, Meteorology, and Measuring Appliances; (4) Metallurgy and Aeronautics; and (5) Optics, Sound, and Radiology. It is hoped that vol. 1 will be ready for publication early in 1922, and it will contain important articles by a number of distinguished contributors. Sir Alfred Ewing has written on thermodynamics, the liquification of gases, and refrigeration, Sir Charles Parsons and Prof. Stoney on the steam turbine, Sir Dugald Clerk and Mr. Burls on the internal-combustion engine, Prof. Dalby on the balancing of engines, and Dr. E. H. Griffiths on the mechanical equivalent; while Dr. Horace Lamb has provided several articles on related mathematical questions. Other topics dealt with are friction, lubrication, ship resistance, manometers, the determination of the elastic constants of materials, dynamometers, the theory of elasticity and its application to structures, hydraulics, and the kinematics of machinery. In the heat section Dr. Coblentz has written on the experimental verification of the laws of radiation, Mr. C. G. Darwin on radiation theory and the quantum, Mr. W. C. D. Whetham on the phase rule, Mr. Ezer Griffiths on calorimetry and pyrometry, and Prof. Porter on thermal expansion. The editor has thus secured the services of a recognised authority on each of the subjects dealt with, and this plan has also been adopted in the remaining volumes which the publishers hope to issue at short intervals after the appearance of the first.